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Proceedings of the regional science peer review of impacts of dredging on fish species at risk in the lower Great Lakes basin

November 28, 2014
Burlington, ON

Chairperson and editor: Lynn Bouvier

Fisheries and Oceans Canada
Great Lakes Laboratory for Fisheries and Aquatic Sciences
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Foreword

The purpose of these Proceedings is to document the activities and key discussions of the meeting. The Proceedings may include research recommendations, uncertainties, and the rationale for decisions made during the meeting. Proceedings may also document when data, analyses or interpretations were reviewed and rejected on scientific grounds, including the reason(s) for rejection. As such, interpretations and opinions presented in this report individually may be factually incorrect or misleading, but are included to record as faithfully as possible what was considered at the meeting. No statements are to be taken as reflecting the conclusions of the meeting unless they are clearly identified as such. Moreover, further review may result in a change of conclusions where additional information was identified as relevant to the topics being considered, but not available in the timeframe of the meeting. In the rare case when there are formal dissenting views, these are also archived as Annexes to the Proceedings.

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TABLE OF CONTENTS

SUMMARY iv
SOMMAIRE v
INTRODUCTION 1
DISCUSSION 1
BACKGROUND INFORMATION 2
PRESENTATION ON REMOTE SENSING STUDY 2
PRESENTATION ON IMPACTS OF DREDGING RESEARCH DOCUMENT 3
DRAFT OF SCIENCE ADVISORY REPORT SUMMARY BULLETS 5
REFERENCES CITED 6
APPENDIX 1. TERMS OF REFERENCE 7
APPENDIX 2. PARTICIPANTS 8
APPENDIX 3. AGENDA 9

SUMMARY

A regional science peer review meeting was held on 28 November 2014 in Burlington, Ontario. The purpose of the meeting was to provide advice on the effects of dredging on fish species at risk.

Two studies were undertaken and served as context for the discussions of the meeting. One, to assess the bathymetry of sites where dredging activities and dredgeate disposal occur; the second, to determine the presence of fish species at risk in sites impacted by dredging activity. Mitigation and alternatives were discussed, as well as the need for a more robust reporting system. Accurate information on the timing and location of dredging activity and dredgeate disposal are critical in developing management decisions and related research.

The Science Advisory Report will provide science information on whether fish species at risk are currently present and are being affected at dredging and spoil deposition sites and will review mitigation strategies and potential alternatives to dredging activities.

Participants of this meeting included members of Fisheries and Oceans Canada (DFO), the Ontario Ministry of Natural Resources and Forestry (MNRF), the University of Windsor and the St. Clair Region Conservation Authority (SCRCA). This proceedings report summarizes the relevant discussions from the meeting and presents recommended revisions to be made to the associated research documents. The working papers presented at the workshop will be published as CSAS Research Documents. The advice from the meeting will be published as a CSAS Science Advisory Report.

Compte rendu de la réunion régionale d'examen scientifique par les pairs sur les impacts du dragage sur les espèces de poissons en péril dans le bassin inférieur des Grands Lacs

SOMMAIRE

Une réunion régionale d'examen scientifique par les pairs s'est tenue le 28 novembre 2014 à Burlington, en Ontario. La réunion avait pour objectif de fournir des conseils sur les effets du dragage sur les espèces de poissons en péril.

Deux études ont été menées et ont servi de contexte pour les discussions tenues lors de la réunion. La première, pour évaluer la bathymétrie des sites où les activités de dragage et l'élimination des déblais de dragage surviennent; la deuxième, afin de déterminer la présence d'espèces de poissons en péril dans les sites touchés par des activités de dragage. Des mesures d'atténuation et des solutions de rechange ont été examinées, ainsi que la nécessité de mettre en place un système de rapports plus robuste. Des renseignements précis sur le moment et le lieu des activités de dragage et les déblais sont essentiels afin de parvenir à des décisions de gestion et afin de réaliser la recherche connexe.

L'avis scientifique fournira les données scientifiques à savoir si des espèces de poissons en péril sont actuellement présentes sur les sites de dragage et de dépôt des déblais et si elles sont touchées; l'avis examinera aussi les stratégies d'atténuation et les solutions de rechange possibles à l'égard des activités de dragage.

Les participants à cette réunion comprenaient des représentants de Pêches et Océans Canada (MPO), du ministère des Richesses naturelles et des Forêts (MRNF) de l'Ontario, de l'Université de Windsor, et de la SCRCA (St. Clair Region Conservation Authority). Le présent compte rendu résume les discussions pertinentes tenues lors de la réunion et présente les modifications suggérées à apporter aux documents de recherche connexes. Les documents de travail présentés lors de l'atelier seront publiés en tant que documents de recherche du Secrétariat canadien de consultation scientifique (SCCS). L'avis découlant de la réunion sera publié en tant qu'avis scientifique du SCCS.

INTRODUCTION

Annual dredging is a crucial aspect of the maintenance of safe and navigable waterways along the Lake St. Clair shoreline; however, there are concerns that the dredging activities may have an impact on fish species listed under the federal *Species at Risk Act* (SARA), whether directly (e.g., mortality of individuals) or indirectly (e.g., reduction in the amount of suitable habitat). Additionally, the impact of dredgeate disposal on species at risk in Lake St. Clair is currently unknown.

A peer-review meeting was held at the Canadian Centre for Inland Waters, Burlington, Ontario, and via WebEx/Teleconference on 28 November 2014. The purpose of the meeting, as described in the Terms of Reference (Appendix 1) was to:

1. Determine whether fish species at risk are currently present at dredging and spoil deposition sites where they were known to exist historically;
2. Determine if fish species at risk are directly or indirectly being affected by the dredging activities both at the dredging and spoil deposition sites;
3. Review the potential use of fish salvage as a mitigation strategy; and,
4. Review whether there are alternatives to annual dredging activities or mitigation measures that would reduce the impacts on fish species at risk and their habitat.

A remote sensing study was performed by the University of Windsor along the southern Lake St. Clair shoreline. This study was discussed as it related to appropriate spoil site placement, dispersal time of dredgeate, and the need for accuracy and clarity on the timing and location of dredging. DFO also completed fish sampling surveys at both impact (dredged, dredgeate) and reference sites to determine fish community composition, and to determine the potential effects of dredging activities. These studies provided context for the discussions held.

Meeting participants included Fisheries and Oceans Canada (DFO), the Ontario Ministry of Natural Resources & Forestry (MNRF), the University of Windsor, the University of Toronto and the St. Clair Region Conservation Authority (SCRCA) (Appendix 2). The meeting followed the agenda outlined in Appendix 3.

This proceedings report summarizes the relevant discussions from the peer-review meeting and presents revisions to be made to the associated research documents. The Research Documents (Barnucz et al. 2015, Gardner Costa et al. 2015) were the working papers presented at the meeting. The Science Advisory Report (SAR) provides science information on whether fish species at risk are currently present and are being affected at dredging and spoil deposition sites and will review mitigation strategies and potential alternatives to dredging activities.

DISCUSSION

The chairperson presented the objectives of the meeting and an explanation of the science advisory process. The chairperson then provided an overview of the meeting's agenda and the presenters who would be speaking over the course of the meeting, as well of a review of the objectives. The DFO science advisory process was summarized for participants. Two draft research documents had been developed and were provided to the participants in advance of the meeting. These two research documents were to form the basis of discussion throughout the meeting and would provide context for the discussions to inform the science advice. Participants were encouraged to ask questions and contribute knowledge and expertise to develop a consensus on the conclusions, recommendations and advice.

BACKGROUND INFORMATION

Presenter: Jason Barnucz

The presenter opened with a presentation on Lake St. Clair, the study site for both research documents. The presenter described the ongoing need to clear obstructions and dredge river mouths to maintain safe and navigable waterways. Historical sampling had detected species at risk such as Eastern Sand Darter (*Ammocrypta pellucida*), Channel Darter (*Percina copelandi*) and Northern Madtom (*Noturus stigmosus*) in proximity to these locations. There is concern that annual dredging activities pose a threat to fish, including species at risk. As such, there is a need to determine the potential impact of dredging activities on fish species at risk; and if a negative impact does exist, what mitigations and alternatives can be implement to reduce the impact.

There were no questions following this presentation.

PRESENTATION ON REMOTE SENSING STUDY

Presenter: Jesse Gardner Costa

This study was conducted by the University of Windsor along the southern shore of Lake St. Clair. The presenter provided background information on the methods used to conduct the study; a small, unmanned "ROVER" study boat was used to assess the bathymetry of Lake St. Clair rivers and streams. Sonar was used in 2 km^2 zones to collect bathymetry data adjacent to the mouth of each river; there was variability in the frequency and last known date of dredging activity for each.

The presenter reported the results indicating that there was no clear identification of spoil sites. The presenter discussed the implications of not finding clear evidence of spoil sites. This can mean either dredgeate disperses quickly, or that the locations of spoil sites were not accurately reported before the study began. The presenter also pointed out that vegetation was sparse or absent at most of the study sites. The presenter also provided recommendations for management, research and monitoring:

- For management, the placement of spoil sites is crucial. Water depth should be taken into account whenever dredging occurs. Good record keeping is essential, with a minimum of three GPS points to accurately delineate a spoil site. Depth measurements should also be taken, if possible.
- For research and monitoring, a repeated measures study format should be adopted to survey a spoil site before dredgeate is disposed, immediately after disposal, and over time to track the persistence of dredgeate. If the persistence of a spoil site is known, its impact on fish can be determined, as well as its impact on other parameters of interest (e.g., vegetation, depth).

The end of the presentation included a brief discussion on the calculations involved in estimating the amount of material removed during a dredge.

Following the presentation, participants and the presenter discussed the possibility that spoil sites may not have been detected at the study sites because dredgeate was not disposed where it was reported to have been disposed. The presenter returned to the matter of accurate recordkeeping on the behalf of organizations carrying out dredging activities; whether or not rapid dispersal of dredgeate is occurring, accurate information on the timing and location of a spoil site is crucial when conducting studies on their impacts.

Participants discussed the possibility of dredgeate being sidecast, rather than disposed at marked disposal sites. The presenter informed the group that the Puce River study site showed

a distinct berm on either side of the channel in the bathymetry data. Unfortunately, pre-dredge bathymetry data was not available to inform the discussion.

A participant noted that it is difficult to conclude if sidecasting occurred, because Lake St. Clair is shallow nearshore. The participant suggested that to inform this knowledge gap, a project could be done to study depths at reference and impact sites. Also noted in this discussion was that the sediment transport dynamics in the nearshore of Lake St. Clair are currently not well understood.

A discussion followed on the current guideline that deposition sites should be a minimum 3 m in depth. The 3-m guidance was originally suggested based on hydrologic principals of Lake St. Clair, in that sediment deposited at this depth would still be a part of the littoral drift within the lake.

Video records do exist for certain spoil sites, as videoscopes have been used in the past to determine if dredgeate was dispersing. It was noted by a participant that sediment buildup has not been observed. As per previous dredging permit requirements, video records were once provided to MNRF and DFO; however, none of the participants from either organization were aware that these videos existed.

A participant noted that the current rules and regulations (through MNRF) does not require a permit for dredging if the dredgeate is intended to be removed from the water and put on land. A participant stated that dredgeate disposal cannot occur on or near vegetation; in such a case, the dredgeate must be put on dry land.

PRESENTATION ON IMPACTS OF DREDGING RESEARCH DOCUMENT

Presenter: Jason Barnucz

Leading into the presentation, the presenter explained that the presentation summarizes many figures and tables found within the research document. Following this, the sampling design for the study was presented, describing the criteria for selection of reference and impact sites. Four types of sites were included in the study (dredging impact, dredging reference, dredgeate impact and dredgeate reference).

The presenter described the sampling methods employed during the study; a Gerken Siamese trawl was used to sample 100-m transects within each site. Habitat surveys were completed immediately following trawls to minimize any disturbance to the fishes. By employing a two-boat approach, the presenter stated that the work can be accomplished in less time by having separate crews for trawling and habitat surveys.

Several analyses were performed on the data including a comparison of catch per unit effort (CUE) between impact and reference sites, a comparison of CUE between seasons, and a comparison of CUE between repeated trawls.

The presenter described the results of the study. A total of 54 sites were sampled in 162 trawls, many thousands of individual fish were caught from 26 species. A single species at risk specimen (Eastern Sand Darter, *Ammocrypta pellucida*) was captured. The presenter noted that species at risk have been caught in Lake St. Clair at other trawling sites, in previous surveys. A participant inquired as to whether previous catches of Northern Madtom in 2012 Lake St. Clair sampling events were at dredged sites; the presenter explained that they were not, because the locations of dredged sites were not known in 2012. The presenter stated that Northern Madtom have been caught in Lake St. Clair between Pike Creek and the mouth of the Detroit River. Some small madtoms were caught at the mouth of Pike Creek and the Puce River, and were identified as Brindled Madtom (*Noturus miurus*).

The presenter provided a brief summary of the habitat survey, and summarized the discussion section of the research document. It was concluded that the direct impacts of dredging activities on species at risk in Lake St. Clair is likely low. This conclusion was based on the results of the trawl surveys and the recommendations from Dextrase et al. (2014), leading the presenter to believe that if present, species at risk abundance is very low. The presenter also noted that to date, no detection analysis has been performed on Northern Madtom, Channel Darter or Eastern Sand Darter within lentic systems using a small benthic trawl.

The presenter indicated that it is difficult to determine if fish species at risk are directly or indirectly impacted by dredging at either dredged or dredgeate sites. Historic species at risk records do exist from the southern shore of Lake St. Clair. Provided that sufficient mitigation steps are taken, the impacts of dredging activities to species at risk would be minimal.

A review of the potential application of fish salvage as a mitigation strategy was then described by the presenter. The results of this study would indicate that it is difficult to salvage fishes in Lake St. Clair as a mitigation strategy, and the use of trawling to salvage fish pre-dredging is not recommended. Alternatives to annual dredging were also described by the presenter.

The presentation was concluded with recommendations for future sampling. It was suggested that this type of study could be conducted over a time series to gain a better understanding of seasonality of habitat usage by fish. Future studies would require cooperation with stakeholders to obtain more accurate information (exact location and timing) on dredging activities.

Following the presentation, a participant re-stated that 3 m is a maximum depth for dredgeate disposal to preserve substrate presence in the lake's littoral drift. The lack of a clear dredgeate site was also raised as a potential sign that the dredgeate is dispersing as intended. The need for accurate spoil site information was re-stated (location, timing and depth). Dredging, video recording and compliance are not always done consistently or by the same parties; as such, better oversight is needed to ensure proper disposal guidelines are being followed, and that accurate recordkeeping is being done.

A participant raised a concern regarding the title of the research document. They suggested that the title may broaden the scope of the work done too widely, as the work was done in Lake St. Clair, while the research document's title references the lower Great Lakes basin. After some discussion, participants agreed to modify the title to more accurately reflect the scope of the work done in Lake St. Clair. However, it was agreed that the proposed mitigation components may be transferrable to the other areas within the Great Lakes.

Historical fish abundance was then discussed. Although there is not much historical data on the sampled locations, the fish community is comparable.

A participant suggested that perhaps reference sites may not be appropriate as they are also impacted. A participant responded that there are no true reference sites because we have poor historical knowledge of species at risk distribution within Lake St. Clair. In addition, given the sampling effort it is reasonable to assume that if species at risk fishes are present that they exist at very low abundances.

A discussion followed on whether findings from these studies would be applicable to informing general dredgeate disposal guidelines. The participants agreed that the recommendations provided by this research should apply exclusively to instances where dredgeate is being placed on like substrate (i.e., sand-on-sand disposal). It was also decided that in cases where dredgeate is being disposed in areas with aquatic vegetation, the potential for impacts on the fish community is much higher, as the dredgeate may be drastically altering fish habitat. Participants agreed that the research document should be more explicit in stating that recommendations only apply to sand-on-sand disposal.

A participant noted that the recommendations should clearly indicate that advice is only applicable for fishes. Additional research is necessary to assess the impacts of dredging on mussels.

Participants followed this with a discussion on the timing windows. The draft research document included a recommendation to change the timing window for dredging activity from November 1st to March 15th (currently, the window is set at March 15th to July 15th). A participant remarked that reducing the timing window may adversely impact stakeholders' ability to conduct dredging work, as the fall and spring present challenges to any type of work being performed on water. Another participant added that there is some need for flexibility when issuing permits for dredging, as unforeseen circumstances, such as colder temperatures and persistence of ice well into the spring may inhibit dredging activities. On the recommendation of management biologists, concessions have been made in previous years to allow more flexibility in timing restrictions. Another participant remarked that dredging permit requests are generally received in the spring; stakeholders tend to prefer to dredge in the spring. Participants supported the notion of flexibility in the spring timing window for dredging, based on lower fish abundances in the spring.

A second factor in determining appropriate timing is water temperature. A participant stated that once water temperature rises to 10°C, fish abundance and movement increase substantially.

A participant observed that one assumption made in the current timing window is that some fish species do not move in the spring as they tied to their spawning beds. In the warmer months (from April onward), fish are more mobile and can flee from dredging activities.

Consensus was reached to remove the recommendation of altering the timing window from the research document. The wording will be maintained regarding spring fish abundances, and it should allow for some flexibility in the spring timing window.

DRAFT OF SCIENCE ADVISORY REPORT SUMMARY BULLETS

Presenter: Lynn Bouvier

While most of the summary bullets required no changes, some modifications were agreed upon by the participants:

- The need to have accurate reporting on the location, timing and depth is crucial to carrying any studies on the impacts of dredging; a point will be added to emphasize this.
- Bullet 9 will be condensed.
- A bullet will be added to emphasize that this report applies only to sand-on-sand disposal.
- Requesting an estimate of the volume of substrate dredged may be added in the mitigation recommendations, in addition to the timing and location of the dredgeate disposal.

REFERENCES CITED

Barnucz, J., Mandrak, N.E., Bouvier, L.D., Gaspardy, R., Price, D.A. 2015. Impacts of dredging on fish species at risk in Lake St. Clair, Ontario. DFO Can. Sci. Advis. Sec. Res. Doc. 2015/018. v + 12 p.

Gardner Costa, J., Wang, L., Mackey, S.D., and Ciborowski, J.J.H. 2015. Remote sensing of the bathymetry and substrate of selected areas of Lake St. Clair - using the Remote Operated Vehicle for Environmental Research (ROVER) to detect dredging spoil piles near selected river mouths. DFO Can. Sci. Advis. Sec. Res. Doc. 2015/017. v + 23 p.

Dextrase, A.J., Mandrak, N.E., Barnucz, J, Bouvier, L, Gaspardy, R, and Reid, S.M. 2014. Sampling effort required to detect fishes at risk in Ontario. Can Manuscr. Rep. Fish. Aquat. Sci. 3024: v + 50 p.

APPENDIX 1. TERMS OF REFERENCE

Impacts of dredging on fish species at risk in the lower Great Lakes basin

Regional Peer Review– Central and Arctic Region

November 28, 2014
Burlington, Ontario and via WebEx/Teleconference

Chairperson: Lynn Bouvier

Context

Newly proposed and ongoing annual dredging activities, in harbour mouths in the lower Great Lakes and specifically along the Lake St. Clair shoreline, may be affecting fish species at risk. Clearing obstructions from river mouths is necessary to ensure the maintenance of safe and navigable waterways. However, there are concerns that this activity may have negative effects, directly (e.g., mortality of individuals) and indirectly (e.g., reduction in the amount of suitable habitat), on fish currently listed under the federal *Species at Risk Act* (SARA). In addition, the impact of spoil deposition on fish species at risk in Lake St. Clair, as a result of dredging activities, is unknown.

Fisheries and Oceans Canada (DFO) Species at Risk program has requested advice from DFO Science on the impacts of dredging in the lower Great Lakes basin on fish species at risk. In addition they have requested updated information on the fish assemblages in areas dredged on an annual basis, and where proposed dredging activities are being considered.

Objectives

The objective of the meeting is to provide advice on the effects of dredging in the lower Great Lakes on fish species at risk. Specifically, science advice is required to:

1. Determine whether fish species at risk are currently present at dredging and spoil deposition sites where they were known to exist historically;
2. Determine if fish species at risk are directly or indirectly being affected by the dredging activities both at the dredging and spoil deposition sites;
3. Review the potential use of fish salvage as a mitigation strategy; and,
4. Review whether there are alternatives to annual dredging activities or mitigation measures that would reduce the impacts on fish species at risk and their habitat.

Expected Publications

- Science Advisory Report
- Proceedings
- Research document

Participation

- Fisheries and Oceans Canada (Science, Species at Risk)
- Ontario Ministry of Natural Resources and Forestry
- University of Windsor
- Michigan Department of Natural Resources
- Conservation authorities
- Other invited experts

APPENDIX 2. PARTICIPANTS

Last name	First name	Affiliation
Balint	Dave	Fisheries and Oceans Canada, Species at Risk
Barnucz	Jason	Fisheries and Oceans Canada, Science
Belore	Megan	Ontario Ministry of Natural Resources and Forestry
Bouvier	Lynn	Fisheries and Oceans Canada, Science
Cleland	Eric	Ontario Ministry of Natural Resources and Forestry
Fortin	Grant	Note taker
Gardner Costa	Jesse	University of Windsor
Gibson	Scott	Ontario Ministry of Natural Resources and Forestry
MacIntyre	Kate	Ontario Ministry of Natural Resources and Forestry
Mandrak	Nick	University of Toronto
Smith	Kelli	St. Clair Region Conservation Authority
Stanley	Kyle	Ontario Ministry of Natural Resources and Forestry
Visser	Rick	Ontario Ministry of Natural Resources and Forestry

APPENDIX 3. AGENDA

Impacts of dredging on fish species at risk in the lower Great Lakes basin

Regional Science Advisory Meeting

Burlington, ON

Chairperson: Lynn Bouvier

Friday, 28 November 2014

Time	Title	Presenter
10:00 - 10:30	Introductions, Objectives of Science Review, and Process	Lynn Bouvier (DFO)
10:30 - 10:45	Background information	Jason Barnucz (DFO)
10:45 - 11:05	Presentation on Remote Sensing Study	Jesse Costa (University of Windsor)
11:00 - 11:20	Discussion	
11:20 - 12:00	Presentation on Impacts of Dredging Research Document	Jason Barnucz (DFO)
12:00 - 1:00	Lunch (not provided)	
1:00 - 1:30	Discussion	
1:30 - 3:00	Draft of SAR summary bullets and conclusion of meeting	Lynn Bouvier (DFO)